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ABSTRACT

A study tested predictions for I/E (internal external) frame of reference model and extended this model to include locus of control. A sample of upper elementary (n=181) and junior high (n=191) students in the United Arab Emirates participated in the study. Structural equation modeling (SEM) analyses provided support to the external comparison predictions of the I/E frame of reference model for boys and to a lesser extent for girls. Relations among achievement, self concept, and locus of control were not the same across gender. Mathematics self concept significantly predicted both internal and external locus of control only for girls. Verbal self concept failed to predict internal and external locus of control, but verbal achievement did not have such effects. The present study confirmed previous findings for the I/E model with western samples, thus adding more to the universality of the model. However, the findings relating achievement, self concept, and locus of control may need more investigation with some emphasis directed to the level of specificity at which each of the constructs was measured. Whereas self concepts were content specific, locus of control is generalized. The validity and reliability of locus of control in non-western settings should be investigated further to achieve more reliable and consistent results. (Includes two tables and one figure. Contains 77 references.) (BT)

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FRAME OF REFERENCE MODEL OF SELF-CONCEPT AND LOCUS OF CONTROL: A CROSS GENDER STUDY IN THE UNITED ARAB EMIRATES

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ABSTRACT

The purpose of this study was to test predictions for I/E frame of reference model and extend this model to include locus of control. A sample of elementary (181) and junior high (191) students participated in the study. Structural equation modeling (SEM) analyses provided support to the external comparison predictions of the I/E frame of reference model for boys and more clearly for girls. Internal comparison predictions were also supported for boys and to a lesser extent for girls. Relations among achievement, self-concept, and locus of control were not the same across gender. Mathematics self-concept significantly predicted both internal and external locus of control only for girls. Verbal self-concept failed to predict internal and external locus of control either for boys or girls. Mathematics achievement had significant indirect effects on internal and external locus of control but verbal achievement did not have such effects. The present study confirmed previous findings for the I/E model with western samples, thus adding more to the universality of the model. However, the findings relating achievement, self-concept and locus of control may need more investigation with some emphasis be directed to the level of specificity at which each of the construct was measured. Whereas self-concepts were content specific, locus of control is rather general. The validity and relaibilty of locus of control in non-western settings should be investigated further to achieve more relaible and consistent results.

Mathematics is stereotyped as a male domain (Fennema & Sherman, 1978) whereas reading and languages are stereotyped as female domains (Marsh, 1989; Parson, Meece, Adler, & Kaczala, 1982; Skaalvik & Rankin, 1994). In their review of research, Maccoby and Jacklin (1974) concluded that boys demonstrated higher mathematics ability and that girls demonstrated higher verbal ability. Results of empirical subsequent research have been mixed. Some researchers have shown that high school boys outperform girls on mathematics achievement tests whereas in elementary school boys and girls don't differ. (e. g., Ewers, & Wood, 1992, Marsh, 1989, Skaalvik, 1990). Meece, Wigfield and Eccles (1990) and Randhawa (1994) reported significant mathematics achievement difference in favor of boys. Skaalvik and Rankin (1994) found no significant difference in mathematics achievement between boys and girls for sixth and ninth graders, but found significant difference in verbal achievement favoring girls in the same two grades.

Several explanations have been offered to account for gender's difference. Some researchers have argued that sex differences in mathematics achievement, in particular, result from superior male mathematical ability (e.g. Benbow & Stanley, 1980, 1983; Jensen, 1980). Others have argued that the difference is due to the pattern of quantitative coursework taken by men and women (e.g., Ethington, & Wolfle, 1984, 1986, Pallas & Alexander, 1983). A third group of researchers argued that the difference between men and women in mathematics achievement is due to differential socialization processes (e.g., Abu-Hilal 1992; Eccles, 1987; Fennema & Sherman, 1978; Marsh, 1989, 1993; Randhawa, 1994).

Gender, self-concept and achievement

Marsh (1989) explained that sex stereotypes and differences in socialization patterns may reinforce boys' positive attitudes, motivation, and self-perceptions in mathematics and girls' attitudes, motivation and self-perceptions in language arts. Therefor, boys may show more confidence in their mathematics abilities than their verbal abilities, whereas girls may show more confidence in their verbal abilities than their mathematics abilities (Marsh, 1986, 1993; Skaalvik, & Rankin,1994). Consequently, it has been predicted that boys would have higher mathematics self-concept than girls and that girls would have higher verbal self-concept than boys (Eccles, 1987; Eccles, Adler, & Meece, 1984; Pallas & Alexander, 1983). Several empirical studies have provided support to the hypothesis that boys have higher mathematics self-concept than girls (e.g., Eccles, 1987; Eccles, Wigfield, Harold & Blumenfeld, 1993; Marsh, Byrne, & Shavelson, 1988; Marsh, Parker, & Barnes, 1985; Marsh, Smith, & Barnes, 1985; Martin & Debus, 1998, Meece, et al., 1990; Skaalvik, 1994; Stevenson & Newman, 1986). However, some researchers have failed to provide support to such hypothesis (e. g., Marsh, 1989; Marsh et al. 1985; Parson, Meece, Adler, & Kaczala, 1982). Also, some researchers (e. g., Marsh et al., 1988; Marsh, Parker, & Barnes, 1985; Marsh, Smith, & Barnes, 1985; Stevenson & Newman, 1986) reported that verbal self-concept was higher for girls than boys, however, several studies have failed to support such result (e.g., Eccles, et al., 1993, Marsh, 1989, 1986, 1993, Skaalvik, 1994, Wigfield, Eccles, MacIver, Rueman, & Midgly, 1991). Marsh, Barnes, Crains and Tidman (1984) found singnificant sex effect on reading self-concept but found no such effect on mathematics self-concept for children in primary grades. Marsh et al (1984) concluded that sex differences in math self-concept are not well established before junior high school. Later, Marsh (1989) however, found small gender differences (invariance among constructs' correlations) with high school subjects and concluded that his results didn't support the differential socialization hypothesis.

Researchers have not focused on only comparing boys and girls' achievement, abilities, self-perceptions, and attitudes, but some have explored the pattern of relation among these variables for boys and girls also. Researchers (e.g., Abu-Hilal 2001; Ethington, & Wolfle, 1986; Skaalvik, 1994) have found that the pattern of relation is not the same across gender. For example, Ethington Wolfle (1986) found that the correlation between mathematics achievement and attitudes for boys was greater than the correlation for girls. Similarly,

Randhawa, Beamer, and Lundberg (1993) found that attitude and self-efficacy in mathematics were related to achievement more strongly for boys than for girls.

Internal/External frame of reference.

Marsh, Walker and Debus (1991) argued that students use their performances in various domains and the performances of their classmates to establish frames of reference for self-evaluation. Specifically, Marsh and Shavelson (1985) stated that "students based their academic self-concepts in particular subjects on their ability in that subject compares with other students (external comparison) and how their ability in that particular subject compares with their abilities in other subjects (internal comparison)" (p. 120). External comparison process predicts that good verbal skills lead to higher verbal self-concept and good mathematics skills lead to higher mathematics self-concept. Internal comparison process, on the other hand, predicts that good mathematics skills lead to lower verbal self-concept and good verbal skills lead to lower mathematics self-concept. These predictions have received considerable attention and support by empirical research with western samples (e.g., Byrne & Shavelson, 1987; Hay, Ashman, & van Kraayenoord, 1997; Marsh, 1984, 1986, 1988, 1990, 1994; Marsh, Byrne, & Shavelson, 1988, Marsh et al., 1985; Marsh & O'Niell, 1984; Marsh Walker, & Debus, 1991; Marsh & Yeuung, 1998; Moller, 2001; Skaalvik & Skaalvik, 2001).

Hay et al. (1997) tested predictions for the external comparison process and provided support for those predictions: As students' grades rose above class average, their self-concepts increased, and as students' grades fell below their class average their self-concepts decreased. Hay, Ashman, van Kraayenoord, & Stewart (1999) tested predictions for the internal comparison and demonstrated that students with high reading and low mathematics skills did not increase their reading self-concepts. Also, they found that mathematics self-concept of children with high mathematics skill was reduced when their reading performance was low. Hence, predictions for the internal comparison were not clearly supported by Hay et al. (1999). In earlier studies, Butkowsky (1982) and Newman and Stevenson (1990) found that poor readers but successful in mathematics reported low self-evaluations in mathematics compared with good readers. Poor readers, who were also successful in mathematics attributed mathematics and reading outcomes to external causes, indicating that negative self-evaluations in one domain may transfer to another and not compensating for them. Marsh (1988) reported the results of 8 studies (13 analyses) that tested predictions of the I/E model. Marsh found that the patterns of relations of

mathematics achievement with verbal and mathematics self-concepts, and verbal achievement with verbal and mathematics self-concepts were supportive of the predictions of the I/E frame of reference model in all 13 analyses.

The internal/external frame of reference model is an outgrowth of the cognitive evaluation theory (Fistenger, 1954) and self-worth theory. The cognitive evaluation theory emphasized the use of social comparison as an evaluation of one's performance to a frame-of-reference group, where a downward comparison group helps increasing and an upward comparison group helps reducing the person's self-concept.

According to the self-worth theory (Covington, 1992), an individual learns that one is valued because of his/ her accomplishments. Accomplishments are usually judged by comparing one's accomplishments with those of others and in the context of the perceptions of one's abilities in one domain and in other domains as well. Nicholls (1984) indicated that children's perceptions of their academic abilities decline as they proceed through school. In early school days, children generally believe that effort is very important attribute. Later on, students' self-perceptions of ability and competence tend to decrease as social comparisons are made and as feedbacks from others are internalized. The children's sense of worth begins to depend on whether they do better or worse than other students. Also, children begin to realize that effort doesn't compensate entirely for ability. In any case, children try to preserve and/or enhance their self-worth. Those who succeed would enhance their self-worth, but those who fail and especially who expend effort and still fail would feel a threat to their self-esteem.

Self-worth theory (Covington, 1983, 1992) and self-attribution theory (Rotter, 1966; Weiner, 1979) provided explanation to the tactics individuals use to maintain self-worth in the face of a large amount of negative and threatening social and external feedbacks. Rueda and Dembo (1995) indicated that teachers are not consistent in their feedbacks to their students. Teachers tend to reward more and punish fewer students who expend effort than students who don't try. Therefore, students who don't try are reinforced, and at the same time, they have a handy rationalization that success could have been achieved if proper effort is expended. This safe strategy of many students was summarized by Covington (1983) "Try, or at least appear to try, but not too energetically and with excuses always at hand" (p.149). In Summary, one may select a comparison group that is below his/her level of skill or avoid working hard to preserve and enhance his/her self-concept.

Marsh (1984) argued that the way children attribute outcomes to internal or external causes are related to achievement and self-concept: "academic achievement, self-concept, and self-attributions are interwoven in a network of reciprocal relations such that a change in anyone will produce other changes in order to reestablish an equilibrium (p.1307). He indicated that a positive relation between self-concept and ability attribution has been broadly documented. However, the relation between self-cpncept and effort attribution is controversial. The academic locus of control that is employed in the current study involves effort and competence combined but not ability. Although effort has been classified as a component of internality and its expenditure may reduce negative affect, high effort also implies that low ability is the outcome (Covington & Omlich, 1984). Covington and Omlich proposed that "when the causal role of ability in success diminishes, effort becomes more important" (p.160).

In contrast with self-worth theory, Marsh (1984) argued that self-attributions are determined by achievement and self-concept (see also Calsyn & Kenny, 1977). Nevertheless, Marsh didn't reject that self-attributions determine academic achievement and self-concept and contended that both causal orderings are consistent with his dynamic equilibrium model. Unexpectedly, however, Marsh (1984) found that self-concept was uncorrelated with external attribution whether for success or failure. But, self-concept and internal attributions (positive ability and effort) were positively related. In line with self-worth theory's model of causal ordering, Bandalos, Yates, and Thorndike-Christ (1995) found that mathematics self-concept for college men and women was negatively related to external attributions for success but not for failure. This relationship, however, was not the same for men and women. Also, Bandalos et al. found that self-concept and achievement were substantially related and this relationship was invariant across gender.

As for the literature in Arabic, Abu-Hilal (2001) indicated that very few systematic studies have been conducted to test the relationships among affective and cognitive variables in Arab countries. Specifically, no study has been carried out to test predictions of models and theories such as the I/E model, or self-worth theory. Although we recognize that those theories and models are subject to cultural differences (Salili, 1995) such studies in non-western cultures would broaden and deepen our understanding of those models and theories. Similar to western findings, subject matter like mathematics and science are stereotyped as male domains and language arts and social studies are stereotyped as female domains (Skaalvik & Rankin, 1994). However, whereas western researches have somtimes

reported contradictory results regarding gender differences in achievement and other related affective variables, research in the United Arab Emirates has produced consistent differences favoring girls (e.g., Aal-Hussain, 1993; Abu-Hilal, 1992; Abu-Hilal, 2001; Abu-Hilal & Aal-Hussain, 1997; Abu-Hilal & Abdel-Hamid, 1989; Abu-Hilal & Bahri, 2000; Hassan & Khalifa, 1999).

Several studies in the UAE have shown that girls outperformed boys in almost every subject matter (e. g., Abu-Hilal, 2001; Abu-Hilal & Abdel-Hamid, 1989 Hassan & Khalifa, 1999) and most affective variables such as attitudes, motivation self-concept and effort (e. g., Abu-Hilal 1992, Abu-hilal, 2001; Abu-Hilal & Aal-Hussain, 1997). Abu-Hilal and Abdel-Hamid (1989) compared the scores of boys and girls on the secondary general examinations conducted in 1987 in Al-Ain school district and found the averages of girls were significantly greater than the averages of boys in all subjects except English. Hassan and Khalifa (1999) compared the boys' and the girls' scores in science on the secondary general examinations over a ten-year period and found that girls consistently outscored boys in those ten years.

Abu-Hilal (1992, 2001) also found that girls were better achievers less anxious of mathematics and had more positive attitudes to mathematics than boys. Aal-Hussain (1993) found that high school Emirati girls had significantly higher verbal and, mathematics achievements and self-concepts than boys did. However, he found that the correlations among these variables were similar for boys and girls. Also, Aal-Hussain reported that sex had a significant effect on mathematics achievement after controlling aother variables (e.g., self-concept, IQ, SES), but sex did not have a significant effect on verbal achievement. Abu-Hilal and Aal-Hussain (1997) found that girls were more able to distinguish their self-worth in various areas than boys; girls didn't only score higher than boys did in most of self-concept facets, but were also more realistic and consistent in their self-evaluations. At the college level, Abu-Hilal and Al-Dahri (1993) found that girls had significantly higher GPA and were more motivated than boys. Al-Omer (1995) found that Kuwaiti college girls were more intrinsically motivated than boys.

The present invstigation

Based on previous research in the west and the results of Abu-Hilal and Aal-Hussain (1997) in the Arab culture, the present study was designed to examine the following hypotheses:

(1) Verbal achievement is predicted to be positively related to verabl self-concept, and mathematics achievement to be positively related to mathematics self-concept. The cross links between verbal achievement and mathematics self-concept and between mathematics achievement and verbal self-concept are expected to be negative.

(2) The relationships between self-concept constructs and internal locus of control are predicted to be positive and those between self-concept and external locus of control are expected tobe negative.

(3) It is expected that self-concept constructs would mediate the relations between achievement and internal locus of control positively, while the indirect relations between achievement and external locus of control negatively.

METHOD

Sample

The sample consisted of 259 boys from grades 6 (n=109) and 9 (n=150, and 135 girls from grades 6 (n=72) and 9 (n=41) from Al-Ain school district. Al-Ain school district has 28 elementary public schools (15 for boys and 13 for girls) and 9 junior high schools (4 for boys and 5 for girls). Four elementary schools (2 boys and 2 girls) and four junior high schools were (2 boys and 2 girls) were randomly selected. Because the study was conducted two weeks before the final exams, two of the girl's schools refused to participate in the study. The listwise deletion method of non-complete data dropped 13 cases from the boy's sample and 30 cases from the girl's sample. The final samples were 246 boys and 105 girls.

Instruments

An inventory comprising several scales including two subscales of the SDQ-I (verbal and mathematics) and academic locus of control was administered to intact classes during one class session. The items were read aloud to students in grade 6 only. Verbal and mathematics subscales of the SDQ-I and academic locus of control have been validated in the United Arab Emirates (see Abu-Hilal & Aal-Hussain, 1997, Abu-Hilal & Bahri, 2000, Al-Emadi, 2001).

Self-Description Questionnaire (SDQ-I). Each of the verbal and math self-concept subscales consisted of eight items rated on a 5-point Likert scale: false (1), mostly false (2)

sometimes false/sometimes true (3), mostly true (4) and true (5). Hence, the higher the score the more positive the self-concept. Items related to such things as perceived ability ("I am good at mathematics") and level of comfort with the subject matter ("I like mathematics"). Coefficient alphas were computed for the present sample and found to be .89 and .88 for verbal and mathematics self-concept scales, respectively. Four indexes were created (2 verbal and 2 mathematics) by summing four items for an index.

Academic locus of control. The academic locus of control scale was adapted from Palenzuela (1984). Palenzuela (1984,1988) and Millar and Irving (1995) presented adequate levels of reliability and validity estimates for the scale with American and British samples. The Arabic version used in the current study comprised nine items purporting to measure four constructs: personal competence and effort as a cause for success ("If I want to get a good academic record I have to be competent and I must work hard"), general effort ("In general, I believe that if one is competent and work hard, one will get good results in one's studies"), luck ("Luck is something decisive in the kinds of marks I'll get in my studies"), and helplessness ("I am convinced that whatever I do, my teachers will always give me the marks they want to"). The first two constructs of the scale represented the internal locus of control, while the latter two represented external locus of control. Based on the factor analysis for the item scores, four indexes were created. Each index was a sum of two items, except for personal effort that had three items. Alpha coefficients were computed for internal (.59) and external locus of control (.58). Alphas with college students in the United Arab Emirates (Al Emadi, 2002) were much greater than those reported in this study may be due to the hypothetical nature of some items.

Academic achievement. Grades in Arabic (VACH) and mathematics (MACH) are aggregate of scores representing various academic activities such as assignments, quizzes, and examinations in the two subjects and were obtained from the official school records. The possible range of scores is between zero and 100.

Proposed Model and Analyses

The purpose of the current study was to test of the relationships among the constructs of verbal and mathematics achievement, verbal and mathematics self-concept, internal locus of control, and external locus of control with structural equation modeling. The model tested was composed of three parts: two exogenous variables (VACH and MACH) that were allowed to correlate freely. These two variables were assumed to be directly linked

with verbal and mathematics self-concepts. This part of the model represented the internal/external (I/E) frame of reference model and was based on its predications. The second part linked verbal and mathematics self-concepts with internal and external locus of control. The constructs of internal and external locus of control were assumed to be indirectly predicted by verbal and mathematics achievements through verbal and mathematics self-concepts. The full model is shown in Figure 1.

The correlation matrices of the observed variables for boys and girls were computed, then transformed into covariance matrices, and used as input to the EQS program (Bentler, 1995) to analyze the structural model. Verbal and mathematics achievements were specified to be fixed as manifest variables that were thought to influence the latent endogenous variables. The latent endogenous variables were assumed to be uncorrelated. However, distubances of the two self-cocept constructs for girls were allowed to correlate ad hoc. The chi squared likelihood ratio, LISREL goodness of fit index (GFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA) were used as criteria to assess the fit of models for boys and girls seperately.

RESULTS

In order to explore the relationships among the observed variables, Pearson product-moment correlation matrix was computed, the result of which can be seen in Table 1. Also, means and standard deviations were computed and are presented in Table 1. Inspection of the correlation coefficients and means revealed few significantly different statistics across gender. Because of these differences, the structual analyses were conducted for boys and girls seperately (see Bentler, 1995).

Insert Table 1 about here

Correlations among latent constructs

Prior to testing the structural model, a measurement model was tested for each sex. Of particular interest is the correlations among the latent constructs. Table 2 shows these correlations. For boys, verbal and mathematics self-concepts were significantly correlated ($r = 0.35$, $p. < .01$). Verbal self-concept was not significantly correlated with either internal

(r = 0.18) or external (r = 0.14) locus of control. Niether mathematics self-concept was significantly correlated with internal (r = 0.24) or external (r = -0.06) locus of control. Internal and external locus of control were not significantly correlated (r = -0.24, p. > .05). For girls, verbal and mathematics self-conceptes were un-correlated (r = 0.18, p. > .05). Verbal self-concept was significantly correlated with internal (r = 0.34, p. < .01) but not with external (r = -0.01, p. > .10) locus of cotrol. Mathematics self-concept was positively correlated with internal (r = 0.78, p. < .01) and negatively correlated with external (r = -0.36, p. < .01) locus of control. Internal and external locus of control were negativley correlated (r = -0.59, p. < .01).

Insert Table 2 about here

Structural equations analysis: Boys' results

The analysis of the boys' data yielded a χ^2 (28, N = 246) =131.21, p. = .000 (GFI = .91; CFI = .90; RMSEA = .12). Verbal and mathematics achievements were highly correlated (r = 0.81). The paths from VACH to verbal self-concept (β =0.30, p. < .01) and from MACH to the respective self-concept (β = 0.80, p. < .001) were consistent with our predictions and previous research. The two path coefficients adressed the external comparison predictions of the I/E frame of reference model. It should be noted that the path coefficient from VACH to verbal self-concept is markedly smaller than the path coefficient relating MACH to its respective self-concept. This result tend to support previous results with non-western students (e. g., Abu-Hilal & Bahri, 2000). Abu-Hilal and Bahri contended that the nature and content of mathematics are different from Arabic language. Whereas mathematics primarily deals with numbers, language covers several areas such as grammer, literature, reading, comprehension, dictation, and composition. Abu-Hilal and Bahri argued that it was easier for students to identify self-worth in mathematics than in Arabic.

Also, the structural analysis produced results consistent with predictions for internal comparison. The path coefficients from VACH to mathematics self-concept (β = -0.35, p. < .01) and from MACH to verbal self-concept (β = -0.30, p. .01) were, as was predicted, significantly negative.

In regard to the relations between the constructs of self-concept and the constructs of locus of control, none of the path coefficients was significant and in the predicted direction. The direct path from verbal self-concept to the external locus of control was

significant ($\beta = 0.21$, $p. < .01$) but in the opposite expected direction. That is, students who held positive verbal self-concept tended to attribute their successes and failure to external causes such as luck and helplessness. No indirect relations between VACH and MACH and locus of control constructs were significant.

Insert Figure 1 about here

Girls' Results

The same model was tested for girls with disturbances of the two self-concept latent constructs were set free to correlate as an ad hoc. The analysis of the girls' data yielded a χ^2 (27, N = 105) = 55.86, p. = 001; GFI = .91; CFI = .94; RMSEA = .10, a much improved fit over the boy's model. The two exogenous variables, VACH and MACH, were highly correlated (r = 0.84). The path from VACH to verbal self-concept ($\beta = 0.73$, $p. < .001$) and from MACH to mathematics self-concept, ($\beta = 0.83$, $p. <. 001$) were consistent with the predictions of the I /E frame of reference model and supported the external comparison process.

In regard to the internal comparison, our predictions were also supported. Both of the cross-links were negative as was predicted. However, only the path from MACH to verbal self-concept was negatively significant ($\beta = -0.61$, $p. < .001$); whereas, the path from VACH to mathematics self-concept was negative but non-significant. The path coefficients from mathematics self-concept to internal ($\beta = 0.66$, $p. <. 00$) and to external locus of control ($\beta = -0.43$, $p. < .001$) were significant and in the predicted direction. That is, the more positive self-concept the girl held the more internally oriented and less externally oriented she was. However the results were not the same for the relationship between verbal self-concept and the locus of control constructs. Neither path coefficient was significant (verbal self-concept to internal locus was 0.22, $p > .05$, and to external was .05, $p > .10$). That is, no relation existed between verbal self-concept and the way girls attributed their success or failure.

Consistent with our predictions, MACH had significant indirect effects on internal ($\beta = 0.42$, $p. < .01$) and external ($\beta = -0.39$, $p. < .01$) locus of control. However, no indirect effects for VACH on internal or external locus of control were significant.

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Summary and Discussion

The present study sought to investigate the relationships among achievements and self-concepts of language arts and mathematics, and locus of control. Mathematics and verbal achievements were hypothesized to positively predict mathematics and verbal self-concepts, respectively. It was also hypothesized that verbal achievement would negatively predict mathematics self-concept, and mathematics achievement would negatively predict verbal self-concept. Verbal and mathematics self-concepts were hypothesized to predict positively internal locus of control and negatively external locus of control. Verbal and mathematics achievements were hypothesized to be associated positively indirectly with internal locus of control, but negatively indirectly with external locus of control. It was also hypothesized that the pattern of relations among these constructs would be different for boys and girls.

Consistent with hypotheses and predictions for the external comparisons of the I/E frame of reference model, the results of this study revealed that each of verbal and mathematics achievements was positively related to its respective self-concept. As students compared their skills in each of the two subjects with other students, those with high skills tended to develop more positive verbal and mathematics self-concepts. Conversely, students who had lower verbal and mathematics performance demonstrated less positive self-concept for each of the two subjects. These results are consistent with previous findings by Hay et al. (1997), Marsh (1986, 1990) and Skaalvik and Rankin (1995). Also, these findings replicate previous findings with non-western samples (Abu-Hilal & Bahri, 2000). Abu-Hilal and Bahri concluded that "the effect of verbal and math achievements on their respective self-concepts were straightforward, and were consistent with predictions" (p. 318).

Comparing path coefficients across gender, it can be noted (see Figure 1) that whereas the path coefficients from MACH to mathematics self-concept were similar for boys (0.80) and girls (0.83), path coefficients from VACH to verbal self-concept were markedly smaller for boys (0.30) than for girls (0.73). These results contradict the findings of Ethington and Wolfle (1986). Contrary to the results of Ethington and Wolfle, who found that the relations between mathematics achievement and attitudes were not the same across gender, the paths from mathematics achievement to self-concept for boys and girls were

markedly similar in the present study. The finding of the mathematics segment of the model seem to provide support to Marsh's (1989) gender invariant model, but the finding for the verbal segment contradicts the gender invariant model and provides support to the differential socialization hypothesis.

The relations among self-concept constructs and locus of control constructs are more complex than can be accounted for by our predictions. For boys, none of the path coefficients between the self-concept constructs and locus of control constructs were significant and in the predicted direction. However, for girls, two path coefficients were significant and in the predicted direction. Girls high on mathematics self-concept attributed their failure and success to internal causes, mainly effort. Also, girls low on mathematics self-concept attributed their failure and success to external causes such as luck and biases of teachers. According to the arguments in the first section of this paper, internal locus of control should have been more strongly related to girls' verbal self-concept than to their mathematics self-concept. At least, this is the argument made by many western researchers (e. g., Fennema & Sherman, Ethington & Wolfle, 1986, Skaalvik & Rankin, 1994). The case is completely different in the United Arab Emirates. In the current study boys slightly outscored girls in Arabic and mathematics, an uncharacteristic finding of real achievement for boys and girls in the UAE. Several studies in the UAE have shown that girls outperformed boys in almost every subject matter (e. g., Aal-Hussain, 1993; Abu-Hilal, 2001; Abu-Hilal & Abdel-Hamid, 1989 Hassan & Khalifa, 1999) and most affective variables such as attitudes, motivation self-concept and effort (e. g., Aal-Hussain, 1993; Abu-Hilal 1992, Abu-hilal, 2001; Abu-Hilal & Aal-Hussain, 1997). Abu-Hilal and Abdel-Hamid (1989) compared the scores of boys and girls on the secondary general examinations conducted in 1987 in Al-Ain school district and found the averages of girls were significantly greater than the averages of boys in all subjects except English. Hassan and Khalifa (1999) compared the boys' and the girls' scores in science on the secondary general examinations over a ten-year period and found that girls consistently outscored boys in those ten years. Abu-Hilal (1992, 2001) also found that girls were better achievers less anxious of mathematics and had more positive attitudes to mathematics than boys. Abu-Hilal and Aal-Hussain (1997) found that girls were more able to distinguish their self-worth in various areas than boys; girls didn't only score higher than boys did in most of self-concept facets, but were also more realistic and consistent in their self-evaluations.

The weak relations of chievements and self-concepts with internal and external locus of control is probably due to some limitations inherent in the design of the present study. Specifically, the six variables were measured at different levels of specificity. Whereas achievement and self-concept were content specific (i. e., verbal and math), locus of control constructs were rather generally measured, i. e., they are not related to specific contents. Also, the reliabilities of the two locus of control constructs were rather weak. The instrument was originally developed for older subjects, college students, and it was adapted to younger students. The weak reliabilities of the constructs probably rendered the shared variance with the other constructs be small. In comparison, Marsh (1984) used a well developed and relible instrument of self-attribution where the items were designed to measure self-attribution in reading and mathematics, and their relations with reading and mathematics achievement and self-concepts were examined. Future research with non-western samples may need to consider using more valid and reliable measures of locus of control that are directed to measure locus of control in specific school subjects. As the constructs are measured at the same level of spcificity, predictions then can be tested.

In conclusion, the results of this study seem to support the differential socialization hypothesis. Although no invariance tests across gender were conducted, the magnitude and pattern of coefficients indicated that the relations among the constructs were not the same for boys and girls. Future research with non-western samples may consider investigating this issue further and may add age as another possible confoundig factor with gender.

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Table 1. Correlation Coefficients, Means, and Standard Deviations of the Study Variables for Boys (Above Diagonal) and Girls (Below Diagonal)

Variables	M.	S.D.	1	2	3	4	5	6	7	8	9	10
M.			75.83	74.04	6.26	4.58	13.03	9.48	15.31	14.17	14.02	13.77
S.D.			12.82	17.25	2.73	2.47	2.17	1.27	3.37	4.52	4.28	4.24
1. VACH	71.78	12.93	---	.81	-.32	-.08	-.04	.04	.24	.06	.30	.25
2. MACH	70.20	19.75	.84	---	-.32	-.01	-.01	.03	.16	-.06	.52	.44
3. LUCK	5.92	2.79	.36	-.36	---	.23	-.07	.03	.11	.21	.03	.01
4. HELPLESS	5.74	2.41	-.21	-.22	.48	---	.05	-.13	-.00	.04	.03	.03
5. EFFORT1	13.29	2.10	.34	.34	-.34	-.23	---	.24	.07	.04	.08	.17
6. EFFORT2	9.29	1.27	.20	.17	-.24	-.25	.24	---	.11	.09	.14	.07
7. VSC1	16.21	3.36	.23	.04	.00	-.16	.27	-.01	---	.76	.34	.30
8. VSC2	15.80	3.92	.05	-.14	.01	-.14	.14	-.05	.69	---	.16	.13
9. MSC1	14.31	4.24	.54	.69	-.30	-.26	.40	.22	.21	.06	---	.84
10. MSC2	14.36	4.14	.52	.63	-.33	-.10	.48	.31	.16	-.04	.80	---

Note. VACH: Verbal achievement; MACH: Math achievement;VSC: Verbal self-concept; MSC: math self-concept.

Table 2. Correlation Coefficients Among Latent Factors

Factor	VSC	MASC	Internal	External
VSC	-	.35	.18	.14
MASC	.18	-	.24	.06
Internal	.34*	.78*	-	-.24
External	-.01	-.36*	-.59*	-

p. < .01. VSC: Verbal self-concept; MASC: Math self-concept; Internal: Internal locus of control; External: External locus of control.

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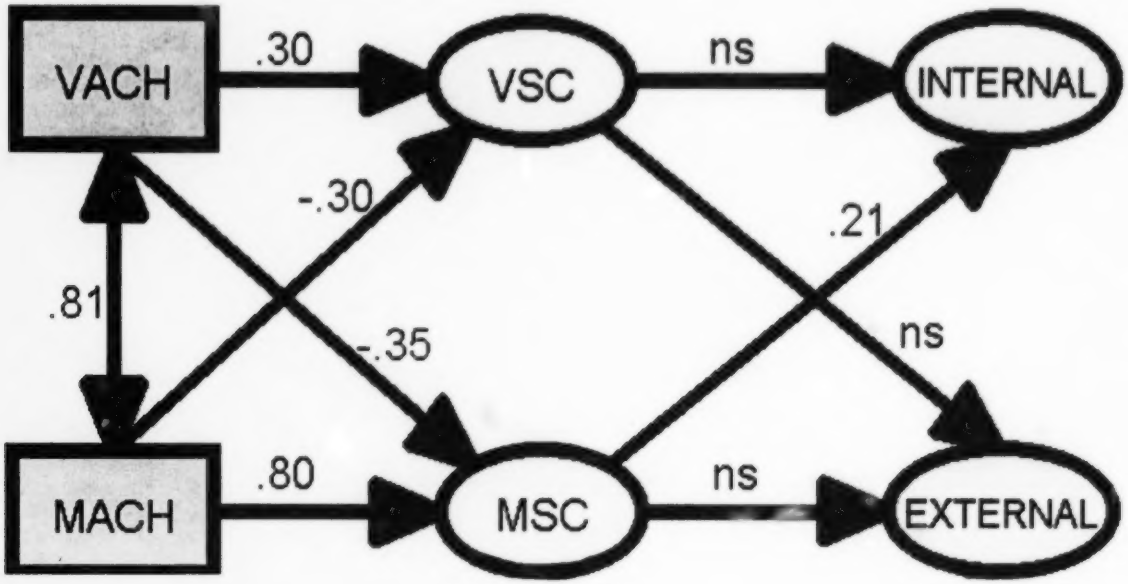
BOYS' MODEL: I/E FRAME OF REFERENCE & LOCUS OF CONTROL



GIRLS MODEL: I/E FRAME OF REFERENCE AND LOCUS OF CONTROL